

MongoDB

Bases de Datos Avanzadas

Universidad del Rosario

Maestría MACC

- 1 JSon
- 2 Estructura general de MongoDB
 - Propiedades
 - Estructura de Base de Datos Documental
- 3 Usando MongoDB
 - MongoDB Atlas y MongoDB Shell
 - Operaciones CRUD
 - Queries
 - Agregaciones
 - Búsqueda en MongoDB Atlas

Estructura General

```
Edit document
{
  "_id" : ObjectId("5a551e5d0e8b6f05c2f97a67"),
  "pais" : "Åland Islands",
  "idpais" : "AX",
  "userInfo" : [{
    "iduserinfo" : "a94b155f-9b87-4afc-a484-2ae752d01de0",
    "username" : "avbravo",
    "datetime" : ISODate("2017-11-05T15:09:27.491Z"),
    "description" : "create"
  }]
}
```

- ❶ JSON: *JavaScript Object Notation*.
- ❷ Diccionario de datos. Almacenamiento en BSON (*Binary JSON*).
- ❸ Sin esquema/*schemaless*.

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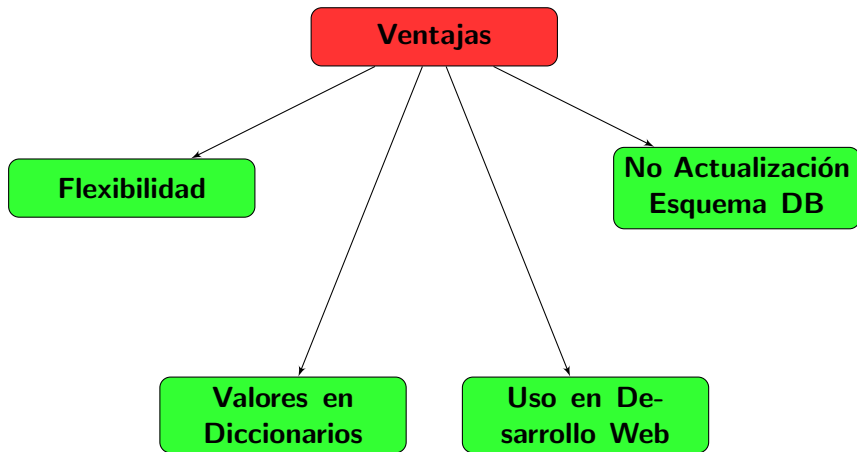
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Estructura General

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Ventajas de JSon



Tipos de Datos en JSON

Tipo de dato	Descripción	Ejemplo
String	Cadena de texto	"Hola", 'Mundo'
Number	Entero o de punto flotante	42, 3.14
Boolean	Valor booleano	true, false
Date	Fecha y hora	ISODate("2022-02-27T01:23:45.678Z")
Object ID	Identificador único	ObjectId("61ab95d4368a2a523ca011e7")
Array	Lista de valores	[1, 2, 3], ["A", "B", "C"]
Null	Valor nulo	null
Binary Data	Datos binarios	BinData(0, "AQID")

Diferencias entre JSON y BSON

Característica	JSON	BSON
Tamaño	Más grande	Más pequeños
Tipos de datos	Limitados	Amplio
Compresión	No	Sí
Orden de campos	Importa	No importa

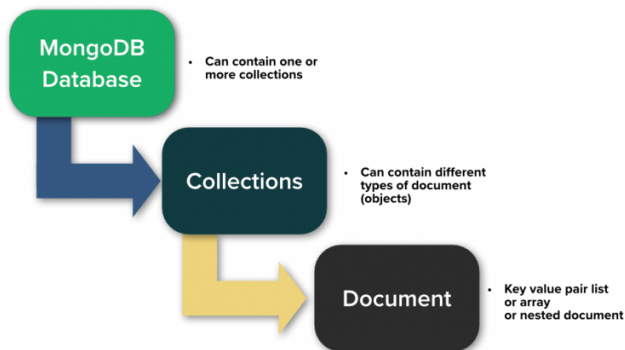
JSON

```
{  
  "array": [  
    1,  
    2,  
    3  
  ],  
  "boolean": true,  
  "null": null,  
  "number": 123,  
  "object": {  
    "a": "b",  
    "c": "d",  
    "e": "f"  
  },  
  "string": "Hello World"  
}
```

BSON

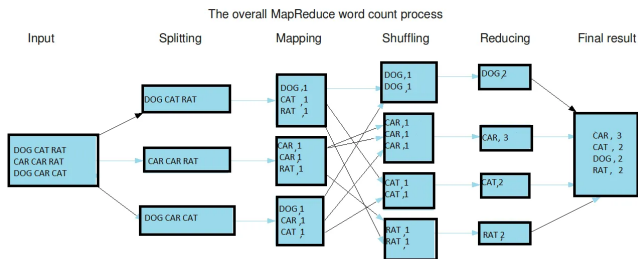
```
{ 01010100  
  11101011  
  10101110  
  01010101 }
```


Jerarquía de Datos



- ❶ Base: **documento**.
- ❷ Colección.
- ❸ Base de Datos Mongo.

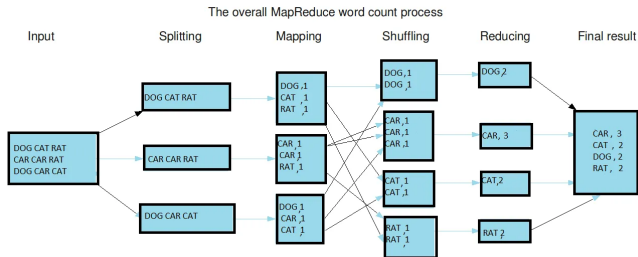
Procesamiento *Map-Reduce*



❶ Soporte para computación en paralelo.

❷ Actualmente: **pipelines** de MongoDB

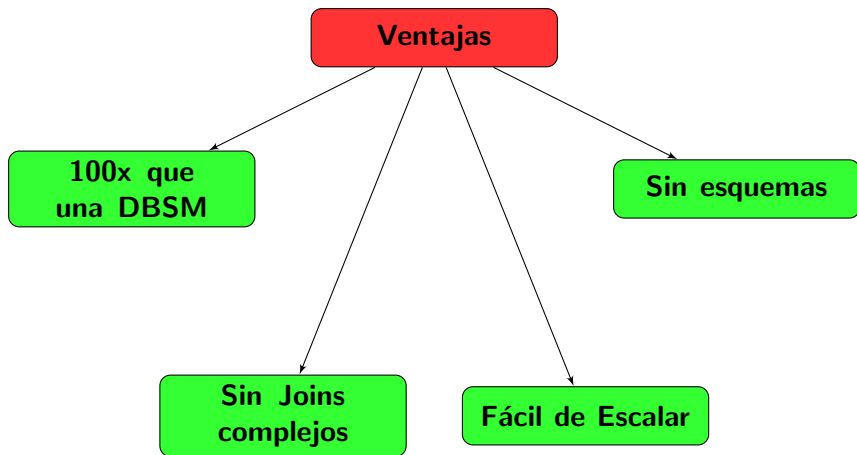
Procesamiento *Map-Reduce*



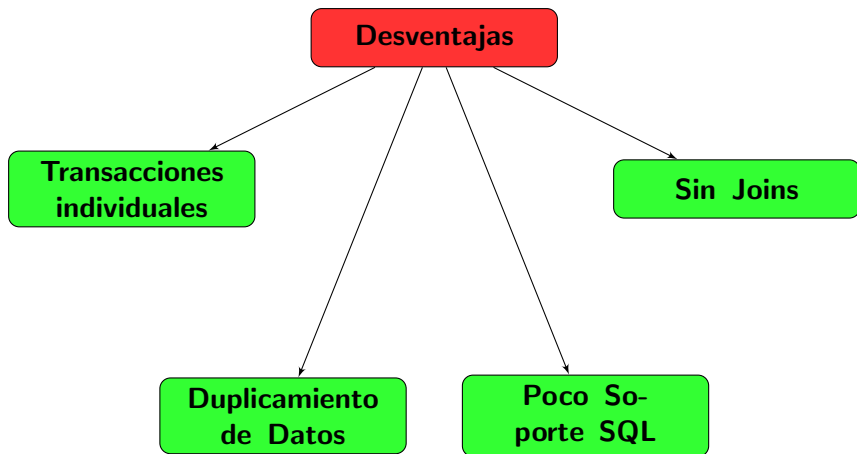
- ❶ Soporte para computación en paralelo.
- ❷ Actualmente: **pipelines** de MongoDB



Ventajas de MongoDB



Desventajas de MongoDB



Escalamiento, Sharding y Réplica

Escalamiento vertical/Escalamiento horizontal



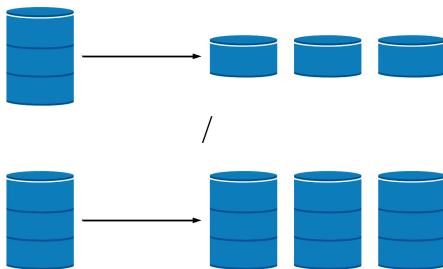
Sharding/Réplica

Escalamiento, Sharding y Réplica

Escalamiento vertical/Escalamiento horizontal



Sharding/Réplica



Ejemplo Base de Datos

```
{name: "John Smith", age: 35, city: "New York"},  
{name: "Jane Doe", age: 28, city: "Los Angeles"},  
{name: "Bob Johnson", age: 42, city: "Chicago"}
```

- ❶ *Claves/Keys:* name, age, city.
- ❷ Documento generado en MongoDB:

Ejemplo Base de Datos

```
{name: "John Smith", age: 35, city: "New York"},  
{name: "Jane Doe", age: 28, city: "Los Angeles"},  
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```

- ❶ *Claves/Keys:* name, age, city.
- ❷ Documento generado en MongoDB:

Ejemplo Base de Datos

```
{name: "John Smith", age: 35, city: "New York"},  
{name: "Jane Doe", age: 28, city: "Los Angeles"},  
{name: "Bob Johnson", age: 42, city: "Chicago"}
```

- ❶ *Claves/Keys*: name, age, city.
- ❷ Documento generado en MongoDB:

```
{  
  "_id": ObjectId("6141c7315e8d5020082f97b2"),  
  "name": "John Smith",  
  "age": 35,  
  "city": "New York"  
}
```

MongoDB Atlas

The screenshot displays the MongoDB Atlas web interface. At the top, the 'Atlas' logo is on the left, and user information 'Juan Santiago...' is on the right. Below the header, a navigation bar shows 'Project 0' and tabs for 'Data Services', 'App Services', and 'Charts'. The left sidebar contains a 'DEPLOYMENT' section with 'Database' selected, and a 'SECURITY' section. The main content area is titled 'Database Deployments' and shows a deployment for 'jscortez'. It includes buttons for 'Connect', 'View Monitoring', and 'Browse Collections'. Below these, there are four performance metrics: 'Enhance Your Experience' (with an 'Upgrade' button), 'Connections' (6.0), 'In/Out' (39.4 B/s / 237.1 B/s), and 'Data Size' (512.0 MB). Each metric has a small line graph showing the last 6 minutes.

- 🔊 Ambiente para almacenar y administrar bases de datos.
- 🔊 Creación de clusters de DBs.
- 🔊 Conexión a MongoDB Shell.

MongoDB Atlas

The screenshot shows the MongoDB Atlas web interface. At the top, there's a header with the Atlas logo, a user profile 'Juan Santia...', and links for 'Access Manager' and 'Billing'. Below this is a navigation bar with 'Project 0', 'Data Services', 'App Services', and 'Charts'. The left sidebar contains a 'DEPLOYMENT' section with 'Database' highlighted, and a 'SECURITY' section with 'Database Access' and 'Network Access'. The main content area is titled 'Database Deployments' and shows a deployment card for 'jscortez'. The card has buttons for 'Connect', 'View Monitoring', and 'Browse Collections'. It also displays performance metrics: Read (0), Write (0), Connections (6.0), In/Out (39.4 B/s / 237.1 B/s), and Data Size (512.0 MB). Each metric has a line graph for the last 6 minutes. A 'Create' button is visible in the top right of the deployment area.

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🔊 Creación de clusters de DBs.

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MongoDB Atlas

The screenshot shows the MongoDB Atlas web interface. At the top, there's a navigation bar with the Atlas logo, a user profile dropdown (Juan Santia...), and links for Access Manager, Billing, All Clusters, Get Help, and a user dropdown (Juan Santiago). Below this is a secondary navigation bar with Project 0, Data Services (highlighted), App Services, and Charts. The left sidebar contains a 'DEPLOYMENT' section with 'Database' (highlighted) and 'Data Lake' (PREVIEW), followed by 'SERVICES' (Triggers, Data API, Data Federation, Search) and 'SECURITY' (Database Access, Network Access, Advanced). The main content area is titled 'JUAN SANTIAGO'S ORG - 2023-01-20 > PROJECT 0' and 'Database Deployments'. It features a search bar 'Find a database deployment...' and a '+ Create' button. A deployment card for 'jscortez' is shown with buttons 'Connect', 'View Monitoring', 'Browse Collections', and a menu icon. The card also has 'FREE' and 'SHARED' labels. Below the buttons, there's a section 'Enhance Your Experience' with a text prompt and an 'Upgrade' button. To the right, there are four performance metrics: Read (R) at 0, Write (W) at 0, Connections at 6.0, and In/Out data rates at 39.4 B/s and 237.1 B/s respectively. Each metric has a line graph for the 'Last 6 minutes' and a 'Data Size' of 512.0 MB.

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MongoDB Atlas

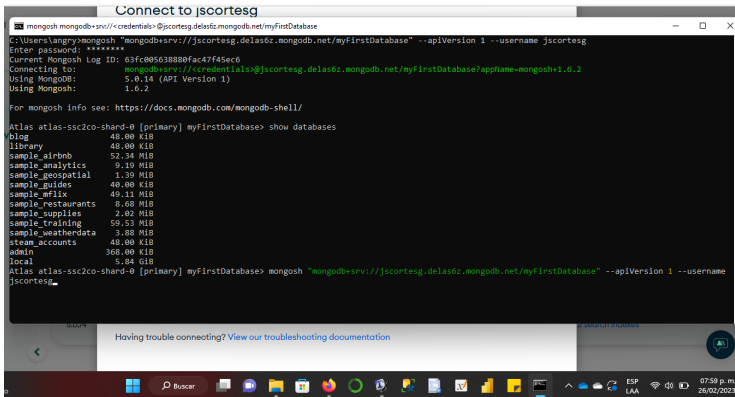
The screenshot shows the MongoDB Atlas 'Database Deployments' page. The top navigation bar includes the Atlas logo, a user profile 'Juan Santia...', and links to 'Access Manager' and 'Billing'. The main header shows 'Project 0' and 'Data Services'. The left sidebar lists navigation options: 'DEPLOYMENT', 'Database' (selected), 'Data Lake', 'SERVICES', 'Triggers', 'Data API', 'Data Federation', 'Search', 'SECURITY', 'Database Access', 'Network Access', and 'Advanced'. The main content area is titled 'JUAN SANTIAGO'S ORG - 2023-01-20 > PROJECT 0' and 'Database Deployments'. It features a search bar and a '+ Create' button. A deployment card for 'jscortez' is shown with buttons for 'Connect', 'View Monitoring', and 'Browse Collections'. Below the card, there are performance metrics: 'Enhance Your Experience' with an 'Upgrade' button, 'R 0' (Reads), 'W 0' (Writes), 'Connections 6.0', 'In 39.4 B/s' and 'Out 237.1 B/s' (Data Rates), and 'Data Size 512.0 MB'. Each metric has a line graph showing activity over the last 6 minutes.

- 🔊 Ambiente para almacenar y administrar bases de datos.
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Características de MongoDB Atlas

Característica	Descripción
Escalabilidad horizontal	Adición o eliminación de nodos.
Respaldo y recuperación	Backup y recuperación de datos automáticas.
Seguridad y cumplimiento normativo	Cifrado de datos, autenticación de usuario, etc.
Monitoreo y alertas	Detección de problemas de rendimiento y capacidad de los clusters

MongoDB Atlas



The screenshot shows the MongoDB Atlas web interface with the MongoDB Shell terminal open. The terminal window title is "Connect to jscorteg". The command prompt shows the user connecting to the MongoDB Atlas instance. The output shows the connection details and the list of databases in the "myFirstDatabase" namespace.

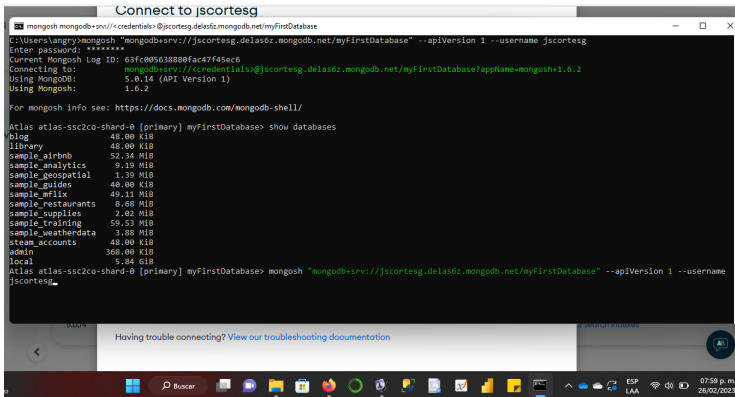
```
mongosh mongodb+srv://<credentials>@jscorteg.delas6z.mongodb.net/myFirstDatabase
C:\Users\angry>mongosh "mongodb+srv://jscorteg.delas6z.mongodb.net/myFirstDatabase" --apiVersion 1 --username jscorteg
Enter password: *****
Current Mongosh Log ID: 63fc00563880fac47f45ec6
Connecting to:
  mongodb+srv://<credentials>@jscorteg.delas6z.mongodb.net/myFirstDatabase?appName=mongosh+1.6.2
Using MongoDB:
  5.0.14 (API Version 1)
Using Mongosh:
  1.6.2

For mongosh info see: https://docs.mongodb.com/mongodb-shell/

Atlas atlas-ssc2co-shard-0 [primary] myFirstDatabase> show databases
blog                48.00 KiB
library             48.00 KiB
sample_airbnb       52.34 MiB
sample_analytics    9.19 MiB
sample_geospatial  1.39 MiB
sample_guides       40.00 KiB
sample_mflix        49.11 MiB
sample_restaurants  8.60 MiB
sample_supplies     2.02 MiB
sample_training     59.53 MiB
sample_weatherdata  3.88 MiB
steam_accounts      48.00 KiB
admin               368.00 KiB
local               5.84 GiB
Atlas atlas-ssc2co-shard-0 [primary] myFirstDatabase> mongosh "mongodb+srv://jscorteg.delas6z.mongodb.net/myFirstDatabase" --apiVersion 1 --username jscorteg_
```

- ❶ Interfaz de línea de comandos.
- ❷ Ejecución de comandos en tiempo real para crear y administrar DBs.

MongoDB Atlas



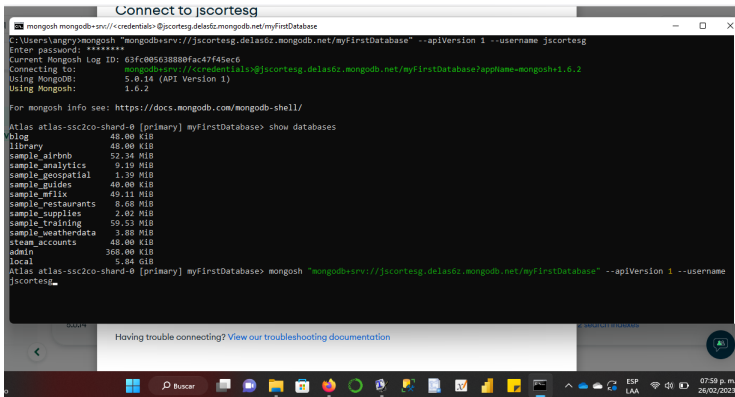
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Atlas atlas-ssc2co-shard-0 [primary] myFirstDatabase> mongosh "mongodb+srv://jscortegs.delas6z.mongodb.net/myFirstDatabase" --apiVersion 1 --username jscortegs_
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MongoDB Atlas



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- ❶ Interfaz de línea de comandos.
- ❷ Ejecución de comandos en tiempo real para crear y administrar DBs.

Características de MongoDB Atlas

Característica	Descripción
Interfaz de línea de comandos	Proporciona una manera interactiva de ejecutar comandos de MongoDB y consultar datos.
JavaScript integrado	Ejecución de comandos y consulta de datos en tiempo real.
Funcionalidad de autocompletado	Facilita la escritura de comandos y consultas.
Acceso remoto a bases de datos	Conexión con una instancia de MongoDB.

CRUD



- ❶ *Create:* `insert()`, `insertOne()`
- ❷ *Read:* `find()`, `findOne()`
- ❸ *Update:* `update()`, `updateOne()`
- ❹ *Delete:* `remove()`, `deleteOne()`
- ❺ **Sintaxis general:**

`db.nombrebase.función()`

(1)

CRUD



- ① *Create:* insert(), insertOne()
- ② *Read:* find(), findOne()
- ③ *Update:* update(), updateOne()
- ④ *Delete:* remove(), deleteOne()
- ⑤ **Sintaxis general:**

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CRUD



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(1)

CRUD



Create



Read



Update



Delete



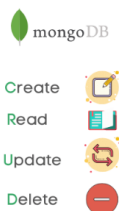
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⑤ **Sintaxis general:**

`db.nombrebase.función()`

(1)

Ejemplos de Queries

I Filtrar:

```
db.users.find({ age: { $gte: 25 } })
```

II Ordenar:

```
db.users.find().sort({ age: -1 })
```

-1: orden **descendente**.

III Paginación (10 documentos por página):

```
db.users.find().skip(10).limit(10)
```

IV Métodos combinados:

```
db.users.find({ age: { $gte: 25 } })  
  .sort({ last_name: -1 }).skip(10).limit(10)
```

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db.users.find({ age: { $gte: 25 } })  
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```

Ejemplos de Agregaciones

I Agrupar:

```
db.products.aggregate([  
  { $group: { _id: "$category", count: { $sum: 1 } } }  
])
```

II Filtrar:

III Ordenar:

IV Proyectar:

Ejemplos de Agregaciones

I Agrupar:

```
db.products.aggregate([
  { $group: { _id: "$category", count: { $sum: 1 } } }
])
```

II Filtrar:

```
db.products.aggregate([
  { $match: { category: "Electronics" } },
  { $group: { _id: null, avg_price: { $avg: "$price" } } }
])
```

III Ordenar:

IV Proyectar:

Ejemplos de Agregaciones

I Agrupar:

```
db.products.aggregate([
  { $group: { _id: "$category", count: { $sum: 1 } } }
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```
db.products.aggregate([
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  { $group: { _id: null, avg_price: { $avg: "$price" } } }
])
```

III Ordenar:

```
db.products.aggregate([
  { $match: { category: "Electronics" } },
  { $group: { _id: null, avg_price: { $avg: "$price" } } },
  { $sort: { avg_price: -1 } }
])
```

IV Proyectar:

Ejemplos de Agregaciones

I Agrupar:

```
db.products.aggregate([
  { $group: { _id: "$category", count: { $sum: 1 } } }
])
```

II Filtrar:

```
db.products.aggregate([
  { $match: { category: "Electronics" } },
  { $group: { _id: null, avg_price: { $avg: "$price" } } }
])
```

III Ordenar:

```
db.products.aggregate([
  { $match: { category: "Electronics" } },
  { $group: { _id: null, avg_price: { $avg: "$price" } } },
  { $sort: { avg_price: -1 } }
])
```

IV Proyectar:

```
db.sales.aggregate([
  { $group: { _id: "$product", revenue: { $sum: "$price" } } },
  { $project: { name: "$_id", revenue: 1, _id: 0 } }
])
```


Atlas y Búsqueda



Buscar en la DB:

The screenshot displays the MongoDB Atlas Search interface. The left sidebar shows the navigation menu with sections: DEPLOYMENT, Database (with 'Data Lake' and 'PREVIEW' buttons), SERVICES (with 'Triggers', 'Data API', and 'Data Federation'), and SECURITY (with 'Database Access' and 'Network Access'). The main panel is titled 'Search' and shows the 'sample_airbnb.listingsAndReviews' collection. It indicates 'Indexes Used: 2 of 3'. A table lists the index details:

Name	Index Fields	Status	Size	Documents	Actions
airbnb_index	"address", "last_review"	ACTIVE View status details	Primary Node 198.12KB	Primary Node 5,555 (100%) indexed of 5,556 total	QUERY ...

At the top right of the main panel, there are tabs for 'Overview', 'Real Time', 'Metrics', 'Collections', 'Search' (active), 'Profiler', 'Performance Advisor', 'Online Archive', and 'Cmd Line Tools'. Below the tabs is a search bar labeled 'Find a Search Index...' and a 'CREATE INDEX' button.

Atlas y Búsqueda



Crear índice:

Create a Search Index



Configuration Method

Select how you would like to build and customize your Atlas Search index. You can also create, edit, and manage Atlas Search indexes using the [Atlas API](#).

NOTE

The Visual Editor does not currently support custom analyzers.
At this time, Atlas Search indexes cannot be created for time series collections.

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[View Atlas Search Docs](#)

Visual Editor

Learn about index definitions in a more guided experience.

JSON Editor

Edit the raw index definition with an embedded JSON editor.



Atlas y Búsqueda

Refinar índice:

Add Field Mapping

Configure specific field from your collection to index.

Field Name
Type full path or select from list

_id

account_id

limit

products

Escoger campo de búsqueda

▼ **String Properties**

Property	Info	Value
Index Analyzer	Creates searchable terms from data to be indexed.	lucene.standard ▼
Search Analyzer	Parse \$search queries into searchable terms.	lucene.standard ▼
Index Options	Specify information to index	offsets ▼
Store	Index exact document text	true ▼